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Applicant: Lenhardt Maschinenbau GmbH
D-75242 Neuhausen-Hamberg (DE)

Inventor: Karl Lenhardt
D-75242 Neuhausen-Hamberg (DE)

Representatives:
Ulrich Twelmeier, Dipl.-Phys. et al
porta Patentanwälte
U. Twelmeier, MS Physics
W. Leitner, PhD Technology
Westliche Karl-Friedrich-Strasse 29-31
D75172 Pforzheim (DE)

Device for Two-sided Coating of Spacer Frames for Insulating Glass Panes with an Adhesive and Sealing Compound

Abstract: Device for two-sided coating of spacer frames for insulating glass panes with an adhesive and sealing compound, comprising a horizontal conveyor (1) with two nozzles (6, 7) which are located above the horizontal conveyor (1) facing each other, and with a metering device for supplying both nozzles (6, 7) with the adhesive and sealing compound. Each nozzle (6, 7) is associated with its own gear pump (12, 13). The two gear pumps (12, 13) are synchronously driven and receive their adhesive and sealing compound from their own shared reservoir (19).

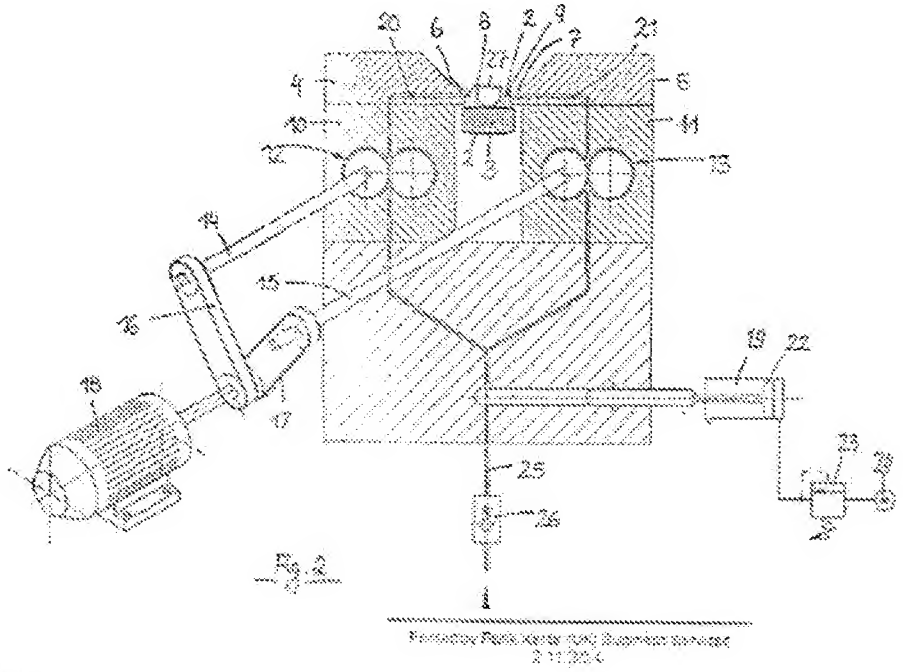

Fig. 2

Description

The invention is based on a device displaying the features stated in the preamble of Claim 1. Such a device has been known from document EP-0 333 693 B1. In order to coat the spacer frame, said frame is placed on a horizontal conveyor and, with the use of said conveyor, is moved between two nozzles that face each other and, in so doing, is coated on both sides.

To achieve a high-quality, durable, tight seal of the glass panels of an insulating glass pane, it is important that both sides of the spacer frame receive equally thick beads of adhesive and sealing compound. This has not been ensured in known devices. Referring to known devices, each nozzle head contains a rotary slide valve. Both nozzle heads are connected to a pressurized reservoir containing the adhesive and sealing compound. The pressure in the reservoir is generated by plunger. The line leading away from the reservoir branches into the two nozzles so that the pressure of the plunger is transmitted to both rotary slide valves. In order to coat the spacer frames, the rotary slide valves are simultaneously opened by means of a parallel linkage of bars. Thereafter, the adhesive and sealing compound is dispensed by way of the least resistance. If a nozzle is at a greater distance from the spacer frame, the thickness of the bead of the adhesive and sealing compound will also be greater. In order to compensate for the thickness tolerances of the spacer frame profile, in particular in the area of bent corners, it is not possible for both nozzles to simultaneously contact the spacer frame, but a potentially variable distance is kept by them. Therefore, the thickness of the bead of adhesive and sealing compound also varies. In addition, in particular during the opening and closing phases of the rotary slides, the pressure-dependent dispensing of the adhesive and sealing compound is subject to random fluctuations, in which case the closure times of the pressure-actuated rotary slides are not exactly synchronous. The pressure-dependent dispensing of the adhesive and sealing compound has the additional disadvantage that the dispensing process reacts sensitively to viscosity changes of the adhesive and sealing compound. The viscosity, in turn, is a sensitive function of temperature. Environmental temperature fluctuations caused, e.g., by an air draft due to opening a factory gate, can already have a detrimental effect on the metering accuracy and thus on the uniformity (better expressed: irregularity) of the beads of the adhesive and sealing compound.

The object of the present invention is to produce, on both sides of the spacer frame, equal beads of adhesive and sealing compound in the simplest possible manner.

This object is achieved by a device displaying the features disclosed in Claim 1. Advantageous developments of the invention are the subject manner of the dependent claims.

In accordance with the invention, rotary slide valves existing in prior-art nozzle heads are replaced by synchronously driven gear pumps, which are supplied with their adhesive and sealing compound from a shared reservoir. This has numerous advantages:

- The gear pumps do not primarily meter the adhesive and sealing compound as a function of pressure, but as a function of quantity (by volume). Influences of temperature fluctuations and viscosity fluctuations on the metering accuracy are thus negligible, in particular, when, as in the preferred development of the invention, the gear pumps are provided close to the orifices of the nozzles in the respective nozzle block.

- As a result of the synchronous drive, in particular with a common drive assembly, an absolute synchronous operation of the gear pumps is assured, so that they have the same throughput of adhesive and sealing compound.

- The amount of adhesive and sealing compound dispensed per unit of time can be easily adjusted by controlling and regulating the rate of revolutions.

- Therefore, a control of the throughput proportional to the speed of the horizontal conveyor is very easily possible, i.e., more accurately than by pressure-dependent metering, even if so-called proportional valves were used in this instance.

- Valves are not necessary in the lines from the reservoir -- from which the gear pumps take the adhesive and sealing compound -- to the nozzles.

- Even without valves in the nozzle head, it is possible to reliably prevent a continued feeding of the adhesive and sealing compound when the coating operation is stopped. The closing function is taken over by the gear pumps themselves, which, in case of a shutdown, immediately interrupt the flow of adhesive and sealing compound; thus, a feeding effect due to the relaxation of the adhesive and sealing compound -- should this be a problem at all -- can be safely stopped simply by a brief reverse operation of the gear pumps. The optimal extent of the reverse operation can be adjusted, based on empirical values, in such a manner that, thereafter, the adhesive and sealing compound is ready at the orifice of the nozzles and that no delay occurs when the coating operation is started.

- Due to the option of proportional control as a function of the speed of the horizontal conveyor, spacer frames can also be coated extremely uniformly in the area of differently bent corners.

- As a result of the fact that valves with variable idle times are not required, the start and finish of the coating operation may be defined more accurately.

- The gear pumps that are synchronously driven with each other and with the drive of the horizontal conveyor can respectively pass one ramp from the start to the finish of the coating operation, as a result of which the achieved desired start and stop points are particularly exact, thereby – even during the start and finishing phases of coating – ensuring a highly accurate bead of the adhesive and sealing compound.

Indeed, the gear pumps are force-feeding pumps; however, within certain limits, their conveying performance is a function of the preliminary pressure. Therefore, an advantageous development of the invention provides that the reservoir, which supplies the gear pumps with the adhesive and sealing compound, be connected to a controllable pressure generator, because it is thus possible to apply an optimal, constant preliminary pressure to the gear pumps. Considering the usually used adhesive and sealing compounds on the basis of polyisobutylene, a preliminary pressure of between 30 and 50 bar is favorable.

An exemplary embodiment of the invention is schematically shown in the two attached drawings. They show in

Figure 1 an oblique view, partially in section, of a coating device in accordance with the invention, and

Figure 2 an oblique view of the same device in cross-section, with the drive for the gear pumps.

The device comprises a horizontal conveyor 1 designed as a continuous belt 2 which is moved over a horizontal support body 3. Two nozzle heads 4 and 5 are located on both sides next to the horizontal conveyor 1, said nozzle heads having respectively one nozzle 6 and 7, said nozzles being arranged – with their on orifices 8 and 9 facing each other – closely above the conveyor belt 2. The nozzle heads 4 and 5 are seated on housing 10 and 11 respectively, said housings containing gear pumps 12 and 13, respectively. Respectively one gear of the gear pumps 12 and 13 is seated on a shaft 14 or 15, which, by means of cogged belts 16 and 17, is driven by a common electric motor 18, so that an absolute, synchronous motion is ensured.

No valve is provided in the lines 20 and 21 between the gear pumps 12 and 13 and the nozzles 6 and 7.

The two gear pumps 12 and 13 are supplied by a shared reservoir 19, which is a piston/cylinder unit comprising a piston 22 that is connected to a hydraulic pressure source 24 via a controllable valve 23 with venting option. As a result of this, the gear pumps 12 and 13 can be supplied with adhesive and sealing compound contained in the reservoir 19 at a constant preliminary pressure. If the supply of

adhesive and sealing compound in the reservoir 19 becomes low, the reservoir content can be replenished – via a feed line 25 containing a check valve 26 – with the adhesive and sealing compound from a not illustrated barrel.

The lower limb of a spacer frame 27 is situated on the conveyor belt 2, in which case both lateral surfaces of said spacer frame are to be coated by the nozzles 6 and 7 facing said lateral surfaces. The distance between the spacer frame 27 and the nozzles 6 and 7 is shown in an exaggerated manner. Referring to a practically implemented device, the distance of the nozzles 6 and 7 can be adjusted in a manner known per se in order to be adapted to spacer profiles having different widths. In the present case, the illustration of the adjustment means was omitted, because they are not essential to the invention.

Patent Claims

1. Device for double-sided coating of spacer frames for insulating glass panes with an adhesive sealant, with a horizontal conveyor (1), with two nozzles (6, 7) that are placed facing each other close above the horizontal conveyor (1), and with a metering arrangement that charges both nozzles (6, 7) with the adhesive sealant, characterized in that each nozzle (6, 7) is allocated its own gear pump (12, 13), that the two gear pumps (12, 13) are driven synchronously, and that the two gear pumps (12, 13) draw their adhesive sealant from a common storage device (19).

2. Device according to Claim 1, characterized in that the storage device (19) is connected with an adjustable pressure generator (23, 24).

3. Device according to Claim 1 or 2, characterized in that only a short, valve-free line (20, 21) is placed between the mouth (8, 9) of the nozzles (6, 7) and the gear pumps (12, 13).

4. Device according to one of the preceding claims, characterized in that the gear pumps (12, 13) have a reversible drive mechanism (18).

5. Device according to one of the preceding claims, characterized in that the drive mechanism (18) of the gear pumps (12, 13) is electronically synchronized with the drive mechanism of the horizontal conveyor (1).

6. Device according to one of the preceding claims, characterized in that the drive mechanism (18) of the gear pumps (12, 13) drives proportionally to the speed of the horizontal conveyor (1).

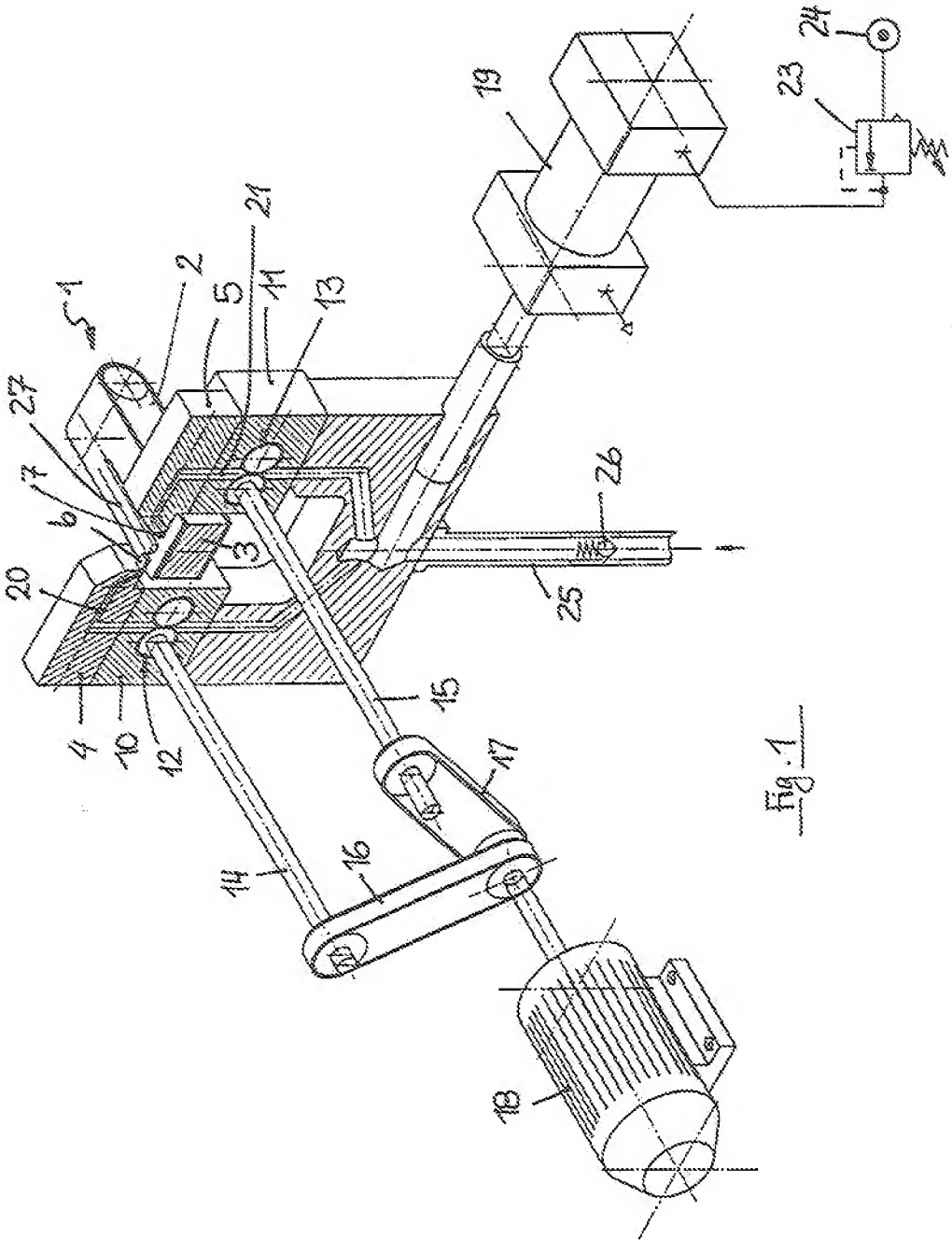

Fig. 1

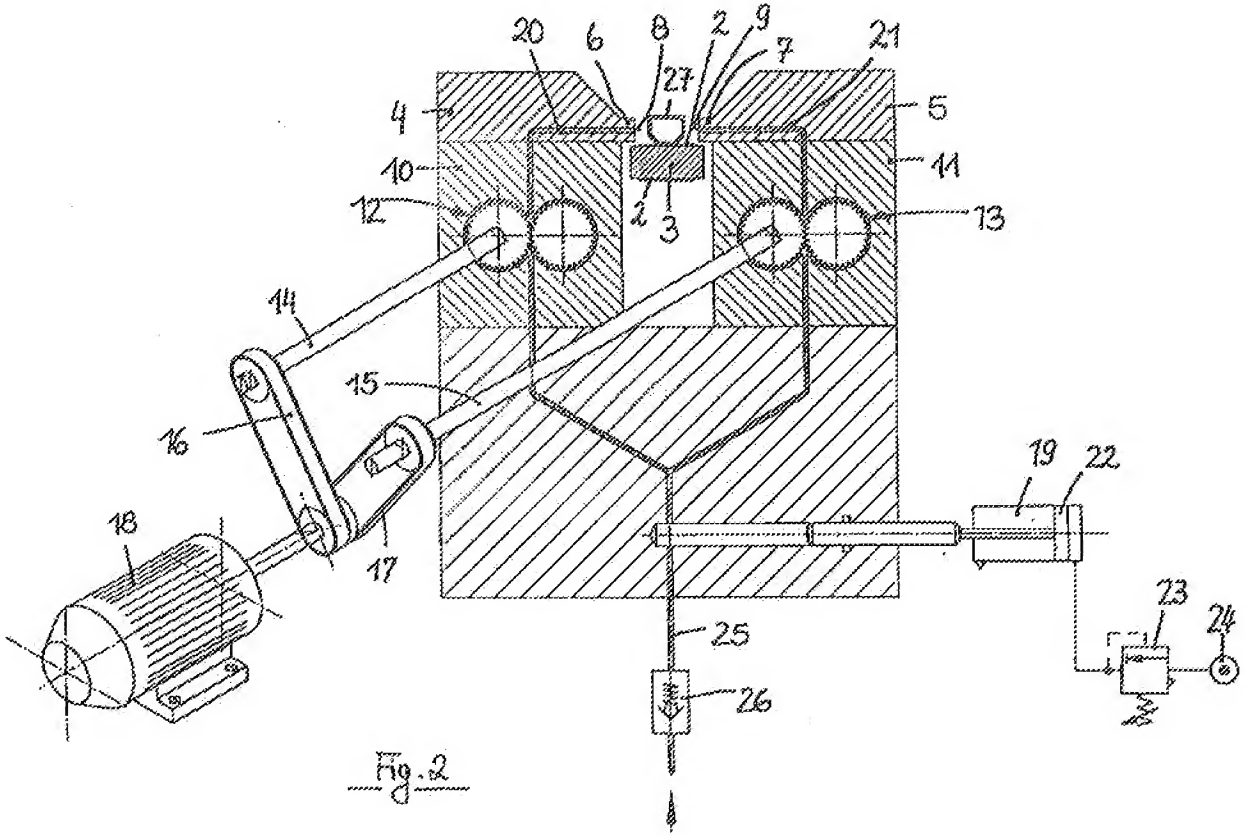

Fig. 2